

## CLAIMS

1. An output termination auto detect circuit for an input device having an output terminal coupled to an input of a host instrument having discrete input resistance terminations wherein the output termination of the input device is the input termination of the host instrument comprising:

a reference resistance in the input device selectively coupled to the output terminal of the input device;

a signal source disposed in the input device coupled to the one side of the reference resistance;

a detection device disposed in the input device coupled to the other side of the reference resistance at a common node between the reference resistance and the input termination resistance of the host instrument for generating a digital value representative of a voltage at the common node;

means for determining the output termination of the input device as a function of at least two digital values representative of the voltage at the common node, the reference resistance and the voltage of the signal source, and generating an output when the output termination of the input device is improperly terminated; and

a display element coupled to receive the output of the determining means for indicating an improper output termination of the input device.

2. The output termination auto detect circuit as recited in claim 1 wherein the determining means comprises a controller receiving the digital value representative of the voltage at the common node and digital values representative of the reference resistance and a voltage output of the signal source and calculating the input termination resistance of the host instrument as a function of the voltage at the common node, the reference resistance and the voltage of the signal source.

3. The output termination auto detect circuit as recited in claim 1 wherein the determining means comprises a controller receiving the digital value representative of the voltage at the common node and a digital value representative of a voltage output of the signal source and calculating a ratio of the voltage output of the signal source in relation to the voltage at the common node to estimate the output termination resistance of the input device.

4. The output termination auto detect circuit as recited in claim 1 further comprising a switching element having a first contact coupled to the reference

resistance, a second contact coupled to signal acquisition circuitry in the input device and a common contact coupled to output terminal of the input device.

5           5. The output termination auto detect circuit as recited in claim 1 wherein the signal source comprises a constant DC voltage reference.

10           6. The output termination auto detect circuit as recited in claim 1 wherein the signal source further comprises a DC voltage source having a detection device coupled thereto for generating digital values representative of the voltage output of the DC source.

          7. The output termination auto detect circuit as recited in claim 1 or 6 wherein the detection devices comprise analog-to-digital converters.

15           8. An output termination auto detect circuit for an input device having an output terminal coupled to an input of a host instrument having discrete input resistance terminations wherein the output termination of the input device is the input termination of the host instrument comprising:

20               a reference resistance in the input device selectively coupled to the output terminal of the input device;

              a signal source disposed in the input device coupled to the one side of the reference resistance;

25               a detection device disposed in the input device coupled to the other side of the reference resistance at a common node between the reference resistance and the input termination resistance of the host instrument for generating a digital value representative of a voltage at the common node;

30               means for determining the output termination of the input device as a function of at least two digital values representative of the voltage at the common node, the reference resistance and the voltage of the signal source, and generating an output when the output termination of the input device is improperly terminated; and

              a back-termination circuit selectively coupled to the output of the input device for terminating the output of the input device in the proper output termination in response to the output from the determining means.

35           9. The output termination auto detect circuit as recited in claim 8 wherein the determining means comprises a controller receiving the digital value representative

of the voltage at the common node and digital values representative of the reference resistance and the voltage output of the signal source and calculating the input termination resistance of the host instrument as a function of the voltage at the common node, the reference resistance and the voltage of the signal source.

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10. The output termination auto detect circuit as recited in claim 8 wherein the determining means comprises a controller receiving the digital value representative of the voltage at the common node and a digital value representative of the voltage output of the signal source and calculating a ratio of the voltage output of the signal source in relation to the voltage at the common node to estimate the output termination resistance of the input device.

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11. The output termination auto detect circuit as recited in claim 8 further comprising a switching element having a first contact coupled to the reference resistance, a second contact coupled to signal acquisition circuitry in the input device and a common contact coupled to output terminal of the input device.

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12. The output termination auto detect circuit as recited in claim 8 wherein the signal source comprises a constant DC voltage reference.

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13. The output termination auto detect circuit as recited in claim 8 wherein the signal source further comprises a DC voltage source having a detection device coupled thereto for generating digital values representative of the voltage output of the DC source.

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14. The output termination auto detect circuit as recited in claim 8 or 13 wherein the detection devices comprise analog-to-digital converters.